

## RESEARCH PROPOSAL (FY07)

**TITLE:** Monitoring the use of the mainstem Columbia River by bull trout from the Walla Walla River subbasin.

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**STUDY CODE:** BT-W-02-1 (Previously)

**DURATION OF PROJECT:** 2007 to 2009

**DATE OF SUBMISSION:** August 4, 2006

## **II. PROJECT SUMMARY**

### **A. Research Goal**

The proposed study is designed to help biologists and managers begin to understand the impact on bull trout populations of FCRPS project operations in mainstem areas of the Columbia and Snake rivers.

### **B. Study Objectives**

The objectives of the proposed study are to determine 1) the relative proportion of bull trout populations that use the mainstem of the Columbia and Snake rivers, 2) when bull trout enter mainstem areas, 3) whether bull trout attempt to pass FCRPS projects, 4) when bull trout leave mainstem areas, 5) how long bull trout reside in mainstem areas, 6) the movement patterns of bull trout between tributaries and mainstem reservoirs, and 7) the movement/use patterns of bull trout within the mainstem of the Columbia and Snake rivers.

### **C. Methodology**

Study Area: The potential study area is defined by the Walla Walla district and includes the river reaches from Hells Canyon Dam to McNary and Priest Rapids dams. The proposed investigation would focus initially on the area bounded by the FCRPS projects at Ice Harbor, McNary and Priest Rapids (Priest Rapids belongs to a PUD). This represents a geographical area where information on bull trout use of the mainstem is lacking.

PIT-tagging: Bull trout will be tagged with Passive Integrated Transponders (PIT) and released in the Walla Walla River subbasin. While some of this tagging has already been done, additional tagging is scheduled for 2007. PIT tag efforts will allow for relatively small fish to be monitored.

ARRAYS: An ARRAY has been installed near the mouth of the Walla Walla River at Oasis Road Bridge where it crosses the Walla Walla River, approximately 10 km from the confluence with the Columbia River. This site is adequate for an ARRAY to be installed and will allow for maintenance and monitoring throughout the year. In addition, this site is sufficiently close to the mouth that fish that pass the site are likely to enter the Columbia River.

Monitoring: The timing and extent of bull trout movements into the Columbia River (McNary Dam reservoir) will be documented. The timing and extent of bull trout movements into the Walla Walla River (from the Columbia River) will be documented. The timing of potential downstream movements through fish bypass facilities will be evaluated by monitoring PIT-tagged fish that pass through detection systems in place at McNary Dam. Although the downstream migration of juvenile bull trout often peaks in the spring, juveniles (for example in the Walla Walla River subbasin) have also been

observed moving downstream during most months of the year (Hemmingsen et al. 2001). Thus, we will monitor this ARRAY during the entire year.

#### **D. Relevance to the Biological Opinion**

Reasonable and prudent measures 10.A.2 and 10.A.3 of the Biological Opinion on the FCRPS call for determination of the presence of and use by bull trout in mainstem Snake and Columbia River reservoirs and habitats associated with the FCRPS dams. In addition, this study also supports other Regional efforts such as the Draft Recovery Plan for bull trout which calls for populations in the Walla Walla and Umatilla river subbasins to be connected and identifies a need for this connectivity to be evaluated. Information provided by the proposed study will be directly relevant to the USFWS 2000 Biop requirements as well as the Draft Recovery Plan efforts.

### **III. PROJECT DESCRIPTION**

#### **A. Background and Justification**

Currently, the U.S. Fish and Wildlife Service (USFWS) recognizes 141 subpopulations of bull trout within four state regions of the Columbia River basin (USFWS 2000). A general decline in abundance resulted in the listing of all populations in the Columbia River Distinct Population Segment as threatened under the ESA in June of 1998 (63 FR 31647). In addition, fluvial populations of bull trout in the Columbia River basin are thought to be close to extirpation (USFWS 2000).

Descriptions of the genetic population structure of bull trout populations suggest that these salmonids fit well within the metapopulation concept (Rieman and McIntyre 1993, Nerass and Spruell 2000). Local populations of bull trout appear to be connected via gene flow associated with a migratory life history. Disruption of migratory corridors causes habitat fragmentation, and potentially eliminates important gene flow (Nerass and Spruell 2000). Further, this disruption physically isolates populations making them more susceptible to extinction (Rieman and McIntyre 1993). Persistent disruption of the migratory patterns of bull trout may result in the loss of this life history type from local populations (USDA 1993). Such a loss increases the vulnerability of populations to local extinction events (Nerass and Spruell 2000). To help protect against this risk, improving connectivity between populations of Columbia River bull trout is a necessary action identified in the USFWS Biological Opinion (USFWS 2000).

Mainstem Snake and Columbia river dams have the potential to impact migratory populations of bull trout. Dams without adequate passage for bull trout create barriers for migration and may isolate previously connected local populations (Nerass and Spruell 2000). Dams and associated reservoirs alter the natural hydrograph (USFWS 1998) and riverine habitat used by migratory trout. Reservoirs create warm water habitats that not only are unfavorable to bull trout, but also provide favorable conditions for exotic predators and competitors (Harza 2000). Bull trout also have the potential to be entrained

at dams and suffer mortality or injury associated with turbines (Skarr et al. 1996). A first step to assess the potential impacts mainstem dams have on fluvial bull trout populations in the Snake and Columbia river basin is to determine the presence of bull trout in the vicinity of these hydroelectric projects.

Little information is available regarding the use of Snake and Columbia river mainstem habitats by adult bull trout from tributary populations. The United States Fish and Wildlife Service (USFWS) Biological Opinion on the FCRPS reviews the limited evidence (USFWS 2000) available. Bull trout have been recently captured in Bonneville and The Dalles reservoirs. Throughout the 1990s, adult bull trout have been observed attempting to pass upstream at Lower Monumental and Little Goose dams. In 1998, a single bull trout was observed at Lower Granite Dam and in December 2004 a bull trout was observed at McNary Dam adult fish ladder. Records of bull trout attempting upstream passage at Lower Columbia River fish ladders are limited. It is important to note that prior to 2000, record keeping on the mainstem had not targeted bull trout and PIT tag detection systems only recently became operational at McNary and Ice Harbor (2002 and 2003 respectively). Adult bull trout have been found moving into mainstem rivers during December – March. Detection of bull trout passing McNary and Ice Harbor dams during this time period is unlikely given the operation and maintenance schedule, which includes shutting down the Juvenile Bypass System.

Bull trout use of the mainstem Columbia or Snake rivers has been documented for fish from the Wenatchee, Umatilla, Grande Ronde, Imnaha, Tucannon, Clearwater, Methow, and Entiat rivers. For example, recent, on-going studies in the Grande Ronde and Imnaha rivers have documented adult bull trout moving out of these tributaries into the mainstem Snake River (for example see Hemmingsen et al. 2001). These recent studies combined with the anecdotal record around the FCRPS dams suggest some level of mainstem habitat use by adult bull trout. Much uncertainty exists regarding the extent of use of the mainstem habitat and, as a result, numerous questions remain. How many bull trout utilize these habitats? Are bull trout present in each reservoir? What is the duration and use of reservoir habitat by bull trout? Are bull trout passing or attempting passage at FCRPS dams?

Although adult bull trout have been observed at counting facilities and around mainstem dams, considerable uncertainty exists about passage conditions at the mainstem dams for upstream and downstream migrating bull trout. The physical design of the passage facilities associated with the FCRPS as well as the times when they are operated reflect the biology of juvenile salmon and steelhead moving downstream and adults moving upstream. The effectiveness of these facilities for adult bull trout is unknown. If bull trout are documented using reservoir habitat in the immediate vicinity of the dam, future efforts would be targeted at documenting passage including route selection and relative success.

## **B. Objectives and Tasks (FY07)**

The initial phase of the study is designed to begin addressing the first two objectives. In addition, this phase will focus on PIT-tagged bull trout in the Walla Walla River subbasin that may enter the mainstem of the Columbia River.

1. Objective 1: Determine the proportion of bull trout from the Walla Walla River subbasin that enter the Columbia River.
2. Determine the time when bull trout from the Walla Walla River subbasin enter and return from the Columbia River.

Task 1: Install PIT tag antennae arrays in the South Fork Walla Walla River (completed).

Task 2: Install a PIT tag antennae array in Mill Creek, a tributary to the Walla Walla River. (completed).

Task 3: Install a PIT tag antennae array near the mouth of the Walla Walla River at Oasis Bridge. (completed).

Task 4: Capture and PIT-tag bull trout in the Walla Walla River subbasin (ongoing). The fish that are tagged will represent the portion of the population that is  $\geq 120$  mm fork length.

Task 5: Maintain the PIT tag antennae array near the mouth of the Walla Walla River. (ongoing).

Task 6: Collect and manage data on the movement of PIT-tagged bull trout that pass the array near the mouth of the Walla Walla River. (ongoing)

Task 7: Analyze the data collected in Task 6. (ongoing)

Task 8: On an annual basis, report the results of the study, both orally and in writing, to the U.S.A.C.E.

## **C. Methodology**

### Design Considerations

Foundation: The proposed study is a multi-year approach designed to meet the stated requirements of the USFWS's FCRPS BiOp. The foundation of this approach is:

- It is designed to utilize and build upon the bull trout studies that are currently in place and generating results.
- It compliments on-going research and monitoring efforts.
- It generates data that has multiple applications to long-term and short-term management questions.
- It takes advantage of existing expertise with arrays that exists in the subbasin.

- It includes a significant amount of cost-sharing.
- It complements ongoing efforts by the states of Oregon and Washington, the Confederated Tribes of the Umatilla Indian Reservation, and numerous county and watershed groups.

Phases: This study proposal identifies numerous objectives and emphasizes the need to make these evaluations on both adult and juvenile forms of bull trout as well as in relatively healthy and weak populations in the Columbia and Snake River basins. However, we propose to implement this study using a phased approach. The initial phase of the study is designed to begin addressing the first two objectives. In addition, this phase will focus on PIT-tagged bull trout in the Walla Walla River subbasin that may enter the mainstem of the Columbia River.

ARRAYS: Studies designed to evaluate the movement of salmonids in the Columbia River basin have commonly used radio telemetry or PIT tag technology. Although valuable, when used independently both of these methodologies have significant limitations. For a radio tag to remain active for an adequate amount of study time, telemetry studies typically focus on larger (adult) fish. Typically, small fish can only be tagged with transmitters that last for 30 to 60 days. Alternatively, PIT tags can be inserted into both small ( $\geq 120$  mm fork length) and large fish. However, the movement of PIT-tagged fish is typically monitored using recaptures in, for example, rotary screw traps. This technique only allows for the evaluation of downstream movement and it is often impossible to operate traps at all times of the year. Currently, we have the opportunity to take advantage of PIT tag antennae array (ARRAY) technology. ARRAYs have numerous advantages over techniques using radio transmitters or downstream traps. These include: 1) relatively high recapture (interrogation) efficiencies, 2) the ability to monitor throughout a 12 month period, and 3) no mortality resulting from monitoring. In the case of the Walla Walla River subbasin, other advantages are that more than 1,300 bull trout (which has been estimated to represent approximately 30% of the population which is likely to be of migratory size) in the South Fork Walla Walla subbasin have already been tagged and all PIT-tagged species in the subbasin (e.g. *Oncorhynchus mykiss*) can also be monitored.

#### **D. Facilities and Equipment**

The proposed study requires an array and associated equipment be operated and maintained at Oasis Road Bridge. Other equipment that is required includes arrays in the South Fork Walla Walla and Mill Creek, as well as PIT tags and equipment to capture bull trout. Much of this equipment is already in place and would be shared with the proposed study. Additional trapping sites will be investigated.

#### **E. Impacts**

We will be coordinating extensively with other on-going bull trout studies in the project area and would expect only beneficial impacts associated with this study and other

research. We will handle and tag up to 100 bull trout when water temperatures are below 16° C. We expect handling and tagging mortality will not exceed 5%. This proposed project should not have any detectable impact on population health or status of bull trout. Some Chinook salmon and steelhead juveniles may be handled during the initial sampling period for bull trout, but the effects to salmon and steelhead populations from the proposed project should also be minimal. Any take associated with this project will be covered by existing state and federal permits.

#### **F. Collaborative Arrangements and/or Sub-Contracts**

This study will be conducted in collaboration with the Oregon Department of Fish and Wildlife, Washington Department of Fish and Wildlife, the Confederated Tribes of the Umatilla Indian Reservation and Utah State University. These groups are currently involved in projects with bull trout that will be coordinated with this proposed study to provide a more complete picture of bull trout ecology in the project area. Coordination will allow us to minimize costs and take advantage of existing expertise in the subbasin.

#### **IV. LIST OF KEY PERSONNEL**

Mr. Darren Gallion - Principal Investigator  
Dr. Timothy Whitesel- USFWS  
Dr. Howard Schaller - USFWS  
Dr. Phaedra Budy – Utah State University  
Mr. Don Anglin - USFWS

#### **V. TECHNOLOGY TRANSFER**

We expect to provide information on the relative importance of mainstem areas to the biology and life history of bull trout. We expect to be able to estimate the relative proportions of bull trout moving into and out of the McNary Dam reservoir. We also expect to determine the timing of movement into and out of the reservoir. This information will be directly applicable to the United States Army Corps of Engineers (USACE) assessment of FCRPS impacts on listed bull trout populations. This information could be used to guide the operation of FCRPS and aid in the recovery efforts for bull trout. Information acquired during the proposed work will be transferred in the form of written and oral research reports. A presentation will be made at the Corps' annual Anadromous Fish Evaluation Program Review. A draft report will be provided to the COE by December 15, 2007 and the final report will be completed after appropriate review. Technology transfer activities may also include presentation of research results at regional or national fisheries symposia, or publication of results in scientific journals.

#### **VI. REFERENCES CITED**

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